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THE ALBERTA INSTITUTE OF AGROLOGISTS'
STUDY OF SOIL EROSION



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Cover Photo:

The "A.I.A." Soil Erosion Committee members discussing their report in its final stages; left to right: C. A. Weir; Dr. O. S. Longman; A. E. Palmer, Chairman.

Photo courtesy of The Calgary Herald.

**Edited and Published by the Alberta Institute of Agrologists 1961
with Offices in
The Faculty of Agriculture,
University of Alberta,
Edmonton, Alberta.**

Original documents submitted by the Committee Members may be found at this office

"It is now a question whether human culture, which rests upon the use of the soil, can devise and enforce ways of dealing with the earth which will preserve this source of life so that it may support the men of ages to come. If this cannot be done, we must look forward to the time — remote it may be, yet clearly discernible — when our kind, having wasted its great inheritance, will fade from the earth because of the ruin it has accomplished."

Shaler.

FOREWORD

The Alberta Institute of Agrologists, a body of professional agriculturists practicing agriculture within the province, passed the following resolution at the group's 1959 annual meeting:

"SOIL DRIFTING"

1. WHEREAS the arable lands of this Province are limited, and
2. WHEREAS the encroachment of urban and industrial development is further limiting this area, and
3. WHEREAS the vital depth of our soils is only a few inches, and
4. WHEREAS erosion is constantly taking a toll, and
5. WHEREAS erosion by wind during the past two spring seasons has become serious, and
6. WHEREAS prairie agriculture has lived on a soil depletion economy, and
7. WHEREAS prairie lands should be tilled in order to improve their potential capacity, and
8. WHEREAS our educational program is a slow, evolutionary process, and
9. WHEREAS some governmental agencies have legal rights with respect to controlling damage, and
10. WHEREAS we in our profession are vitally concerned with the long-time welfare of agriculture —

THEREFORE be it resolved that this convention, in Annual meeting, advise its incoming Council to consider the appointment of a Committee within its membership to review and report on the present condition of our soils from an erosion position, the attitude of farm operators toward control programs, the effectiveness of control legislation, and the possibilities of maintaining and improving our soils.

The committee subsequently appointed by the 1959/60 Agrologists Council was composed of:

A. E. Palmer, Chairman, retired superintendent, Dominion Experimental Farm, Lethbridge, Alberta.

C. A. Weir, retired District Supervisor, Plant Products Division, Canada Department of Agriculture, Calgary, Alberta.

Dr. O. S. Longman, retired Deputy Minister, Alberta Department of Agriculture, Edmonton, Alberta.

The "A.I.A." recognizes at this time its deep debt to these men, who tackled their task with enthusiasm, and whose report follows. We are conscious of the fact that perhaps at no other time in the history of the province was it possible to draw upon so much experience in the minds of so few men. And, characteristic of the type of man who enters the profession of agriculture, they gave of their experience freely and willingly.

INTRODUCTION TO THE PROBLEMS

Erosion of our soil persists. Are the citizens of Alberta giving adequate attention to soil conservation? Are we devising, enforcing and practising ways and means of preserving our small share of the Canadian inheritance?

In the early 1930's when soil drifting was so serious across the whole of the prairies, there was a widespread and gloomy opinion that the problem of soil drifting was so complex and so difficult as to be insoluble. Now however, almost no well-informed person holds this view. The change in thinking is undoubtedly the result of the development and widespread use of cultural practices that are effective in preventing or controlling wind and water erosion. Knowing this, one large roadblock still exists, that of getting the farm operators to apply these practices properly and consistently.

CONTROL PROGRAMS

Effective wind erosion control programs are in operation on many farms in Alberta. This is true, especially in the southern part of the province where soil drifting has been most severe in past years.

It is evident, however, that there has been a relaxing of care in following wind erosion control programs during recent years when soil drifting has not been serious. This has been most pronounced among younger farmers who do not remember the erosion experience of the nineteen thirties, and in localities outside of the "chinook belt" of the Province. It is interesting that not many fields in Southern Alberta's chinook belt drifted seriously during the last two years when so much drifting was experienced in other parts of the prairies. The most serious drifting in the chinook area was on irrigated lands where fine seed beds were prepared for small seed crops such as sugar beets, and on a few dry farms operated by careless farmers.

Trash cover fallowing has become a general practice in Southern Alberta, and most farmers are keeping their fallow fields well protected with plant residue cover. Unfortunately, the effectiveness of this practice during the recent good crop years has caused many operators to rely entirely on trash cover protection, and to disregard other protective measures. It is especially noticeable that many have abandoned strip farming because they feel so secure with trash covers. This is likely to put many fields in jeopardy if poor crop years come along and there is not enough stubble to provide a sufficient trash cover to protect large blocks of fallowed land.

Another problem is the seeming lack of knowledge amongst young farmers of emergency methods for controlling drifting, such as listing frozen or unfrozen soil, roughing spots where drifting starts, or covering such spots with manure or straw before these initial spots involve larger areas.

The good years too, have caused lands again to be brought under cultivation which are too difficult to control. This should be avoided. Lands under the control of Municipal authorities, in Special Areas, and even privately held, should not be permitted to come under tillage.

The subject of water erosion control is receiving little attention, although it is evident that there is a gradual removal of soil by water from sloping lands. About the only time that thought is given to water erosion is when gullies begin to form that interfere with cultivation. Removal of top soil by sheet and finger erosion is largely ignored.

"The problem then, is primarily to get the farm operators to apply the needed procedures for control of erosion and ameliorating the damage already caused by wind and water."

The Alberta Department of Agriculture and the Municipal Agricultural Service Boards have the major responsibility for securing needed action. Most of these officials sense this duty, and many areas have good control programs. It is the considered opinion of this committee that soil erosion control should be considered by all extension workers as a major need in every part of the Province, and that those responsible should watch carefully for signs of erosion, and be ready for remedial action at once.

Other agencies are also giving assistance in control of erosion. In one instance, during the serious soil drifting in the 1930's, the Canada Department of Agriculture played a major part through its Experimental Farms System and the P.F.R.A. Substations were established for testing and demonstrating control methods. Agricultural Improvement Associations were organized. The Federal Department is withdrawing, to a large extent, from agricultural extension activities as the provinces develop more efficient extension services. However, the Substations are still maintained for research and testing purposes.

An emergency "crash" program may be needed again in the future. This committee urges that farmers and all others working in the agricultural profession never forget the value of substations and research institutions within the Province in stimulating group action.

We again stress that both the farm operator and society itself must realize that they owe it to each other, and to future generations, to maintain and improve the productive capacity of our soils. Agricultural schools and the University must continue

to send forth leaders imbued with the necessity of complete soil erosion control. They must not only be eager, but also well informed concerning control methods.

All of the agencies concerned with combating soil erosion of course, will direct their efforts toward getting proper action on the part of the farm operator. The trained extension worker will use the various devices at his command to accomplish this end. It has been found that one good tool is to develop a community attitude which implies that soil erosion on a farm denotes careless farming. "Few farmers like to have a dust cloud or a gully advertising their carelessness."

THE PROBLEMS FROM A PRACTICAL PERSPECTIVE

The Committee circulated a questionnaire to District Agriculturists, Municipal District Agricultural Service Board Supervisors, other governmental officials, and a number of selected farmers. Questions asked included the extent of wind and water erosion, acreages withdrawn from cultivation because of erosion, percentage of cultivated acreage sown to perennial forage crops, and opinions on restricting land operations where damage had occurred.

A summary of the estimated acreage damaged by wind erosion during 1959 follows:

Lethbridge (D.A.'s area)	35,000 to 60,000
Cardston (D.A.'s area)	20,000
Taber (D.A.'s area)	negligible
Medicine Hat (D.A.'s area)	negligible
Claresholm (D.A.'s area)	slight damage
Strathmore	100,000
Drumheller	300,000 to 350,000
Wetaskawin	50,000
Camrose	40,000
Stettler	25,000
Sedgewick	10,000
Hanna	200,000

That area reporting the greatest trouble in the spring of 1959 was adjacent to Drumheller. Three reporters from these districts state that virtually all of the land failed in 1958 for seeding in 1959 showed slight to serious drifting in the spring. Apparently the problem from wind erosion for the 1959 season occurred in the areas much farther north than where it is commonly a hazard. The more northerly areas usually have higher precipitation in the summer and more snow in the winter. Brush cover on unbroken land has also been in their favour, until recently. Soil is generally heavier, but smaller particle size appears to have made it more subject to drifting.

One of the questions asked dealt with the extent and increase of plantings of cultivated grasses and legumes. An increase was noted in the Northern sections of the Province, where moisture conditions make it relatively easy to establish stands. In some areas this increase, along with permanent pasture (mostly natural) accounted for approximately half of the acreage on many farms. In most of the Northern area, cultivated forage grasses and legumes were reported to range between 10% and 15% of the cultivated acreage. These were greater in Special Areas where regrassing of drier regions is being carried out. In the Peace River and around Strathmore such crops are increasing annually. Forage production, using perennial grasses and legumes (especially in combination with livestock production) is the best method of suppressing the tendency toward soil drifting. It is also excellent for checking the effects of water erosion.

In some areas land once worked has been withdrawn from cultivation by converting it to pasture. These consist of light soil regions, ridges or hilltops. This is particularly true of Special Areas where it is government policy to reclaim land as pasture.

The consensus of all those reporting was that the known preventative methods were adequate in halting soil drifting, particularly if carefully followed. The maintenance of an adequate trash cover was difficult in years following a dry season when a short crop was harvested. Under these circumstances emergency measures were often necessary in the spring. Most reporters indicated that the careless and unintelligent operators were more often to blame for instances of severe soil drifting. They felt however, that legislation was adequate to deal with such cases.

Strip farming was found to be a successful method to control drifting and most of the reporters were of the opinion that its practice should be retained or increased in almost all areas.

The reporters indicated there is insufficient operator knowledge regarding the most efficient implements to maintain proper stubble mulch, as well as providing control of weeds. Many operators are inclined (for financial and other reasons) to make do with unsuitable machinery. It is known that blades, rod weeders and similar implements will cover approximately 10% of the remaining stubble in each operation while one-way discs or tandem discs will cover and destroy up to 50%. Disc machines are therefore used too frequently in some areas. It is recommended that discs be used sparingly only when necessary, and not for final operations.

There was considerable anxiety about the damage which water erosion is causing in northern and north central regions. Good surface conditions, by maintaining a cover of crop residues firmly anchored in the surface soil, prevented drifting and were efficient in checking and assisting water to enter the soil. In southern areas, and particularly around Cardston, erosion of gentle slopes occurred on poorly protected soils after any heavy rain. Certain soils, especially the dark soils in the Peace River district, seem to be extremely susceptible to water erosion. Shallow water courses across cultivated fields often become ravines. In hilly areas throughout the Province sheet or slope erosion is posing a problem.

How to prevent damage to various lands is causing some concern to the Government of Alberta who, along with the Federal Government, have commenced a study of the situation. Operators are being advised to avoid cultivation of steep slopes, and above all to avoid cultivating up and down the slopes. The adoption of contour farming, the seeding of hills and natural waterways with grass, and the incorporation of vegetable matter into the soil are recommended to allay this hazard.

The survey conducted brought out the fact that credit must be given to those District Agriculturists, Service Board supervisors and machinery manufacturers who are very much aware of the problems, and are anxious to provide help in the way of literature, advice, and instruction on ways and means to prevent depletion of our soil resources.

A SUMMARY OF LEGISLATION

Soil erosion as we know it is caused mainly by three agents — wind, water and man. The degree to which erosion is controlled is determined by two authorities — the land users and society as a whole. Both have a peculiar responsibility of which they must be conscious. Each land user is the custodian of the land entrusted to him for his use. Society represented by its government or governments are the trustees of the land inheritance, and in collaboration with the land users are responsible for the designing of ways and means for its utilization and preservation.

Let us now endeavour to confine our attention to a positive examination of how Alberta has discharged and is discharging its responsibility as a trustee:

An examination of the activities of governmental agencies, also of private agencies, reveals that a substantial effort is being and has been made to create an awareness on the part of the agricultural community — land users, the foresters and others — of the danger of soil erosion and the importance and value of soil conservation. The fact that these efforts are continuing and in some respects are accelerated is evidence that the problem of soil erosion and conservation are matters of growing concern.

What is the nature of these efforts? A study reveals that, insofar as agricultural lands are concerned, they are largely of an educational nature, directed to farmers and land users through various governmental departments and agencies, such as district agriculturists, municipalities, service boards, etc., using the medium of publicity, bulletins, short courses and public demonstrations. The information provided in the aforementioned activities is based upon the practical experience of farmers and work conducted by research institutions, not only within the province but elsewhere. In addition to the foregoing, certain enactments having a direct or indirect bearing upon soil erosion and conservation are being administered by various departments and branches of government to which reference is made later.

Following many insistent requests to the Dominion government following the formation of the province in 1905, the provinces of Alberta and Saskatchewan finally

were granted control of their natural resources in 1930. The request being granted, it is natural to assume the province accepted the primary responsibility to study, initiate, and sustain policies and methods of soil conservation of such a nature and in such a manner as to give the maximum effect in preserving Alberta's land resources. The foregoing statement is not to be interpreted as excluding Federal participation, but it does infer that the province has the responsibility of taking the initiative, a service which any province should perform as evidence of its appreciation of having been granted the trusteeship of its land and water resources. If the task is beyond its economic resources, then an appeal to federal authorities is justified. One measure for determining the degree to which a province is measuring up to its responsibility of trusteeship is by studying the priority, nature and enforcement of its statutes, if any, relating to soil conservation. However, in so doing, one must appreciate that the effectiveness of such legislation cannot be determined by a study of the documentary statutes; the final test is their acceptance and implementation by the public.

THE SOIL DRIFTING CONTROL ACT, R.S.A. 1955, CHAP. 316

Enacted in 1935

Extensive and devastating loss in Alberta due to soil erosion occurred in the chinook belt prior to and especially during 1920. This occurrence found farmers totally unprepared and ill equipped to cope with the situation. The prevailing cultural practice of a dust mulch summerfallow being conducive to this hazard had of necessity to be modified.

For the next fifteen years, farmers and agricultural scientists devoted much time and effort in designing and perfecting machinery and practices to combat the hazard.

By 1934 a substantial degree of wind erosion control had been developed. Out of the deliberations of an officially appointed committee came a recommendation to the Minister of Agriculture that legislation be enacted that would permit penalizing farmers who permitted their soil to drift by neglecting to follow the then best known preventive practices. The bill presented to the legislature was contentious in nature. Central and northern Alberta had not experienced wind erosion. However, out of an awareness of the devastation caused by soil drifting in the south the bill was passed, but not until its penalty clause was substantially reduced. This Act is administered by the Department of Agriculture. No prosecutions under this act have taken place to date; true, a few cases were brought into court, but the penalty of the act was never imposed. It is reported that this was the first act of this kind enacted in Canada; Saskatchewan passed somewhat similar legislation later.

THE SPECIAL AREAS ACT, R.S.A. 1955, CHAP. 317

Enactments 1927, 1931, 1935, 1938

This legislation is administered by the Department of Municipal Affairs and has operated under the titles: Tilley East Area Act 1927-30; Tilley East Area and Berry Creek Area Act, 1931-34; Special Municipal Areas Act, 1935-38; Special Areas Act, 1938 to date.

This legislation represents Alberta's first endeavour to cope with the problems of over population, drouth, soil erosion, and economic land utilization as applied to 365 townships of Alberta's drouth area. It involved depopulation, the disorganization of municipalities and school districts, the enlargement of land holdings, the transfer of lands in arrears of taxes to the Crown and establishment of an authority to administer the re-adjustment and new policies within the region affected.

The present act is significant in respect to the authority given the Minister of Municipal Affairs respecting the utilization of land, which reads as follows:

"Section 13 (c) 1953

to order and require any owner or occupant of lands to adopt such methods of farming or grazing, or farming and grazing as may be deemed necessary to prevent soil drifting or over grazing, or any hazard which may dissipate or nullify any assistance rendered to residents within the special area.

(g) to promote approved farm cultural practices and efficient range management and such community effort and enterprise as may contribute to greater economic security of residents within the special area.

(h) to classify all lands within the special areas for the purpose for which they are considered by him to be the most adaptable, etc. etc."

MUNICIPAL, COUNTY AND IMPROVEMENT DISTRICT ACTS

R.S.A. 1955, CHAP. 215

R.S.A. 1955, CHAP. 64

R.S.A. 1955, CHAP. 150

Municipal authority is the creature of the provincial government. It is under the provisions of the above acts that municipalities, counties and improvement districts are established and receive their authority. Incorporated within these acts are provisions for the municipality to assume the responsibilities set forth in other acts initiated by various departments of government, such as the Service Board Act, Weed Act, etc., thus, in effect, through the departmental acts and amendments to the municipal act, responsibilities may be accepted by or imposed upon municipal authority.

TAX RECOVERY ACT

R.S.A. 1955, CHAP. 324

It is under the provisions of this act that municipalities may take proceedings to dispose of private property to satisfy a claim for arrears of taxes.

During periods of economic depression much privately owned land on the tax roll may be in tax arrears. It was the provision of this act that was taken advantage of in the Special Areas Act, causing such lands to revert to the Crown, and thus to be taken off the tax roll.

PUBLIC LANDS ACT

R.S.A. 1955, CHAP. 259

The Public Lands Act is administered by the Department of Lands and Forests. Under its provisions Crown lands are recorded, classified, leased or sold.

In agricultural leases or sale agreements entered into between homesteaders or farmers and the Department, provisions of the lease impose approved cultural and grazing practices upon the occupant. However, if and when the occupant receives title to the land he is automatically released from restrictions or supervision under this Act. The supervision of cultural practices is performed largely by the inspectors of the Department.

It is the policy and practice of the above Department, that before any agricultural lease is granted to have a detailed land inspection made by a qualified soil inspector who gives the soil a rating and advises if the land is or would be subject to erosion and might be safely cultivated. When the report indicates the land cannot be cultivated safely it is placed in reserve on the records to insure that such land will not be sold for cultivation or allowed to be cultivated. Section 86 of the above act states: "The lessee shall at all times perform, observe and comply with all provisions of any other act that affects the proper utilization and conservation of the lands for the purpose for which they have been granted."

Obviously the Department does not claim that such regulations control erosion. Much virgin land that may be topographically, physically and productively ideal for agricultural purposes, when cultivated may become extremely sensitive to soil erosion.

THE IRRIGATION DISTRICTS ACT

R.S.A. 1955, CHAP. 162

These acts are mentioned in passing because they in effect may be considered as reclamation legislation, and their provisions of management include special authority and privileges respecting land use.

Associated with these acts is the creation of debilitated land arising from seepage and excessive irrigation.

THE AGRICULTURAL SERVICE BOARD ACT

R.S.A. 1955, CHAP. 9 - Enacted 1945

This act is administered by the Department of Agriculture. It provides for financial assistance to municipalities to aid in the carrying out of projects that are of

mutual interest to the municipality and the Department of Agriculture, including such projects as weed control, soil erosion, tuberculosis and brucellosis control, seed cleaning plants, etc. The Department shares to a limited degree in both the cost of administration and materials. Forty-eight municipalities, including counties and improvement districts, have Service Boards.

There is another important feature established by this act. Prior to its enactment a municipality could take possession of land under the provisions of the Tax Recovery Act, but for tax arrears only. Under the Service Board Act provision is made whereby debilitated lands may be taken over by a municipality and rehabilitated. The establishment of this principle is possibly the most important feature of this act.

This act also requires a close alliance between the District Agriculturist, the municipal field supervisor, and municipal council, which contributes to co-ordinated effort and understanding.

This act has received wide acceptance. Today there are forty-nine Service Boards in Alberta. This act, in essence, is an instrument that facilitates a municipality and the Department of Agriculture working together where they have common interests. It replaced a previous inspection or police relationship with one of co-operation.

What has happened or is happening under this act to alleviate soil erosion? (Here the provisions of the act should be read).

The assistance offered to the municipality is set out in a circular issued by the Department of Agriculture under date of February 15th, 1960. The section relevant to soil conservation and erosion reads as follows:

Z SUGGESTED SOIL CONSERVATION AND FERTILITY DEMONSTRATIONS

1. Soil Conservation and Reclamation

- (a) Gully filling demonstrations.
- (b) Wind erosion control demonstrations - forage crops, etc.
- (c) Contour or strip farming demonstrations.
- (d) Reclaiming alkali, solonetz or other problem soils with forage crops, etc.
- (e) Other demonstrations.

4 C Cultivation of Land Under Reclamation

The Department of Agriculture will pay to the Municipality the cost of cultivation up to \$3.00 per acre to a maximum of 50 acres per quarter section. This assistance is applicable only to land placed under Reclamation (Section 14, A.S.B. Act.) (Maximum payment by the Department for 4 C \$300.00)

4 D Forage Seed for Soil Reclamation and Improvement

The Department will share equally with the Municipality and the farmer the cost of approved forage seed to a maximum of 40 acres per quarter section for use on land which is impoverished or in the process of becoming impoverished through weed infestations, wind or water erosion, or any other cause that has seriously affected or may seriously affect the productivity of the land or the welfare of the owner or the occupant of the land.

(Maximum payment by the Department for 4 D \$400.00)

4 E Water Erosion Control

The Department will share equally with the Municipality and the farmer costs incurred in preventing or controlling water erosion by:

- (a) Filling and stabilizing gullies.
- (b) The improvement of water courses.
- (c) Terracing or contour planting.

(Maximum payment by the Department for 4 E \$300.00)

4 F Tree Planting

The Department will pay 1 cent per tree for all trees planted over 20,000 per year provided the planting area and the planting operations are approved and supervised by the Municipality.

(Maximum payment by the Department for 4 F \$200.00)

7 C "Save the Soil" Campaign. (A community contest in soil conservation).

It is reported that in 1959, out of forty-eight municipalities only six took full advantage of the soil reclamation project, seven participated to the extent of \$200.00, while sixteen applied for lesser amounts. Nineteen made no application. Ten applications are the maximum allowed for each Service Board. In 1959 twenty-six municipalities reported 1154 quarter sections of land subject to excessive wind erosion and 875 affected by water erosion. It is reported that some municipalities are not sympathetic to the scheme and look upon it as a provincial responsibility. In 1959 there were 38,000 pounds of seed distributed in the program.

THE EASTERN ROCKY MOUNTAIN FOREST CONSERVATION ACT Statutes of Alberta, 1947, CHAP. 4

This act represents a joint effort on behalf of the Federal and Provincial governments in conservation and preservation of the forest resources on the east Rocky Mountain slope. Originally the Act was administered by a jointly appointed Board, with the termination of the Federal-Provincial agreement it is now administered by the Forestry Branch of the Department of Lands and Forests.

This act is mentioned largely as an example of the co-operative effort of governments that may be executed in the conservation of resources. Also it directs our attention to the problem of erosion arising from the denuding of forest lands and to practices which apply to the solution of this important problem. All of which should be of vital concern to agrologists.

LAND AND FOREST UTILIZATION ACT R.S.A. 1955, CHAP. 3

This is a recent act (1955), presently administered by the Department of Agriculture through an appointed committee on which the Department of Agriculture, Lands and Forests, Municipal Affairs, and the Power Commission have representation.

The declared object of the act is to provide authority and facilities for recommending to the government or Departments of government concerned, effective methods of conserving and utilizing land, forest, and water resources of the province.

Under the act the Minister of Agriculture may recommend, encourage, and promote a system of land ownership or tenancy for marginal or submarginal land, that will provide security of tenure and income and inculcate approved conservation methods and techniques; he also may recommend carrying out, direct, institute, prescribe preventive and control measures for combating or overcoming flooding, soil erosion, soil deterioration, loss of soil fertility or weed infestations — lands that become subject to this act are known as controlled lands.

The following is a very brief resume of work being done to date by the Land Utilization Committee, as reported by the chairman of the Committee:

"Where municipal districts or other local forms of government have areas which are a liability on the local government as a whole, they may apply to the Provincial Government for assistance with such areas Two such areas are the Municipal Districts of Eagle and Minburn. In these municipal districts the Government has purchased the land which was a problem to the municipal district and this money gave the previous owners some capital to start farming operations on more economical units. Once the people were moved out and the land acquired we then seeded it to grass, fenced it, and at the moment are pasturing cattle on the Rannoch Community Pasture which is located in the Municipal District of Eagle. We hope to be pasturing cattle in the Municipal District of Minburn next year. These community pastures will be a great benefit to local farmers who surround the pastures as each will be able to either increase his herd or in some cases can develop a small herd of beef cattle. Their income can be increased considerable because of being able to put cattle in the community pasture for the summer.

The Land Utilization Committee has also been asked to give advice on such matters as how spoil pits and barrow pits from mining, etc., can best be handled. We also have been asked to give a decision as to whether a large tract of land in northern Alberta should be leased to an American firm for seed production. Such things occur occasionally and are referred to the Land Utilization Committee for direction."

It will be observed that here again we have provision for dealing with soil erosion but judging from the quotation of the Chairman's letter, it does not constitute a matter of first concern. In Eagle Municipality the pasture consists of twenty-two and one-half sections, and in Minburn the estimated size is twenty-six sections.

ALBERTA RESEARCH COUNCIL

In the matter of conducting of soil research and the classification of soils, another government agency appears on the soil conservation stage. It is the Alberta Research Council, which operates under its own act and has a co-operative alliance with the Soil Science Division of the University of Alberta and the federal Department of Agriculture.

Extensive soil surveys have been made and the results published. Much of the information accumulated has not been utilized to the fullest extent, and many soil problems throughout the province are yet to be studied. With the great industrialization of the province, the uses of soil multiply and the demand for the time and services of soil surveyors and specialists is increased.

FORESTRY

Finally, mention should be made of the forester. There has been established in Alberta what is known as "The Green Belt". This the forester claims as his domain. However, there is a close relationship between agriculture and forestry. Trees are a crop — they grow from the soil.

OBSERVATIONS

The following observations are made in the hope that they may provoke better understanding and constructive thinking.

Having reviewed and studied the legislation directly and indirectly affecting soil erosion and conservation, also the agencies responsible for the administration of each act, where does the agriculturist fit into the picture? Is there anything the A.I.A. might do that would be of benefit? Is there anything being done elsewhere that Alberta is overlooking? For instance, it should be mentioned that the province of Saskatchewan is closer to this administrative ideal for agriculture than any other province in Canada.

A basic principle of good organization in government is the grouping of related activities into combinations that will provide the most efficient, systematic, and co-ordinated application of available effort to the duties to be performed. It should meet the fundamental test of being able to provide the means of attaining the established objectives. The objectives in the administration of forest, grazing, and farm lands are conservation and the integration of the soil, water, plant, and animal resources in the development of an agricultural program for Alberta or Canada. Such co-ordination must rest firmly on specialized agricultural techniques and therefore in close contact and in co-operation with the agriculturist.

Conservation pervades in some degree practically every agricultural activity which has to do with land use or growth from the soil. Conservation of all natural resources is, however, such a broad social aim that it will not serve as a basis for logical, functional segregation for administrative purposes.

A basically sound division, however, is to group under one department or authority the functions dealing with organic or "renewable" resources. These resources have to do with growth from the soil, with plants and animal life and the interrelations of soil, plants, and water.

Should forests, grazing lands, and agricultural lands belong in the Department of Agriculture, where the resources of these lands may be integrated, where technical services pertaining to them are consolidated, where the agencies with which the forester, the stockman, and the farmer must deal may be found, and in which the efforts toward conservation and retarding erosion may originate or be focused?

With the foregoing as a background it will be observed that the Service Board Act imposes much of the soil erosion control upon the municipal authority. Why? Has the municipality a greater responsibility than the senior authority? Is the municipality adequately equipped to assume this responsibility? Is the responsibility consistent with the municipalities' terms of incorporation and economic resources? Is it appropriate that municipal authority should be required to assume or share the trusteeship of our lands?

In view of the foregoing questions, most of which must be answered in the negative, it is not surprising that there is reported to be a lack of enthusiasm on

the part of municipalities to participate in the soil reclamation phase of the Service Board program, which gives some justification for the modest grants provided by the Department.

In contrast to the aforementioned program, a program is conducted under the provisions of the Land and Forest Utilization Act, in which the Department of Agriculture appropriates funds for the purchase of marginal lands allotted by a municipality. The lands, after being recommended by an Advisory Board, and accepted by the government, are fenced, grassed, and transferred to the Department of Lands and Forests in trust. This Department collects grazing fees and manages the pastures. The revenue thus collected is refunded to the Provincial Treasurer.

Under the Special Areas Act there is another contrast. Here the Special Areas Board administers the lands under the Department of Municipal Affairs. They too operate community pastures under their own regulations.

In addition to the foregoing, there are private community pastures, operated by associations who lease Crown land, make the necessary improvements, and pay the Department the rental fees obtained from their self-imposed grazing fees.

Finally, it should be mentioned that the P.F.R.A. stands ready and waiting to set up community pastures in Alberta if requested.

The foregoing references to community pastures may appear to be irrelevant to the topic of this paper. However, digression is made to indicate variation of procedure and authorities involved in this rather simple matter of land use. Here we have observed the part played by the departments of government — Department of Lands and Forests, Agriculture, and Municipal Affairs, municipalities and Boards — Special Areas Board, Agricultural Service Board, and Land and Forest Utilization Board. All of the departments, municipalities, and boards are motivated by the same desire, namely, the conservation and the most efficient utilization of land. However, the question with which the A.I.A. should be concerned is: Where does the agriculturist stand in this effort? What part has he played, and is he playing? What part should he play?

Agriculture is defined as "the science, art, and industry of utilizing the soil so as to produce a means of human subsistence, embracing in its widest sense the rearing of livestock as well as crops." The soil is agriculture's foundation. It is the function of agriculturists to bring the soil and man into a mutually beneficial relationship; each sustaining and preserving the other. Therefore no department of agriculture can succeed in this task unless it is intimately associated with both the land and its occupant. Trusteeship is a prerequisite to this accomplishment.

It is at this point that most authorities agree that a form of land tenure compatible with the continuing stability of the soil must be found.

CONCLUSION

The committee has attempted to give recommendations and suggestions throughout this report, and it is not its intention to review all of them in this section. We close the main body of this report to the Alberta Institute of Agrologists with a few pertinent comments on research.

As already stated, effective erosion control methods have been developed that meet most situations. However, the problem is so important that no research institution in the Province should fail to be continually on the alert to find better methods, new tools and new skills with which to improve those now available. There is a special need for more accurate measurements to determine the erosive properties of soils under different conditions. The influence of erosion control practices such as trash cover, cover crops, strip farming and tree strips on the control of insects and other farm pests, as well as on soil fertility, production potential and cost of operation, all need further clarification. Also there has been too little testing of the value of trees and shrubs, and the proper procedure in clearing brush lands so as to leave sufficient brush for effective wind breaks.

More information is required on rainfall intensity in various parts of the Province. There is a need for more information on the erosive action by water of different soil types with varying slopes, and the influence of cropping and cultural practices on the erosion of these soils and slopes.

Appendix A LEGISLATIVE REFERENCES

1. The Agricultural Institute of Canada Policy pertaining to conservation of soil and water.
From: Agricultural Institute Review, March, 1954.
2. References pertaining to Soil Erosion in Western Canada.
From: Agricultural Institute of Canada Review, March, 1954.
3. National Soil Conservation Policy Report to the 1954 Annual Conference of Provincial Ministers and Deputy Ministers of Agriculture.
4. Land Use and Soil Conservation Report to the 1958 Annual Conference of Provincial Ministers and Deputy Ministers of Agriculture.
5. Department of Agriculture Acts, Province of Alberta, 1906 and 1955.
6. Soil Drifting Control Act.
7. Special Areas Act.
8. Agricultural Service Board Acts.
9. The Utilization of Lands and Forests Act.
10. East Rocky Mountain Slope Agreement.

The manuscripts referred to in this appendix indicate the conclusions of other Canadian organizations that have documented their views pertaining to land use, conservation, and soil erosion. The careful reading of these submissions will reveal a variation in concepts as to federal and provincial responsibilities; also a change in attitudes is observed as time passes.

These manuscripts reveal the approach made to the problem of land use and conservation by organizations and the provincial Departments of Agriculture. The documents indicate a lack of a desire to assume responsibility and initiative on the part of the provinces. The Federal Government has little or no land to conserve, why should they be urged to design a policy or take the initiative?

Appendix B SOIL EROSION REFERENCES

CANADA DEPARTMENT OF AGRICULTURE PUBLICATIONS

- No. 563, Soil Drifting Control in the Prairie Provinces.
- No. 819, Soil Moisture, Wind Erosion and Fertility of Some Canadian Soils.
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- No. 985, Soil Management Practices in the Upper Peace River Region.

DEPARTMENT OF EXTENSION, UNIVERSITY OF ALBERTA

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Circular No. 19, Protect Prairie Soils

FROM: THE AGRICULTURAL INSTITUTE REVIEW

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The above firms have very kindly participated on an equal basis in financing the cost of this publication.

The Alberta Institute of Agrologists is deeply indebted to them for their assistance.